

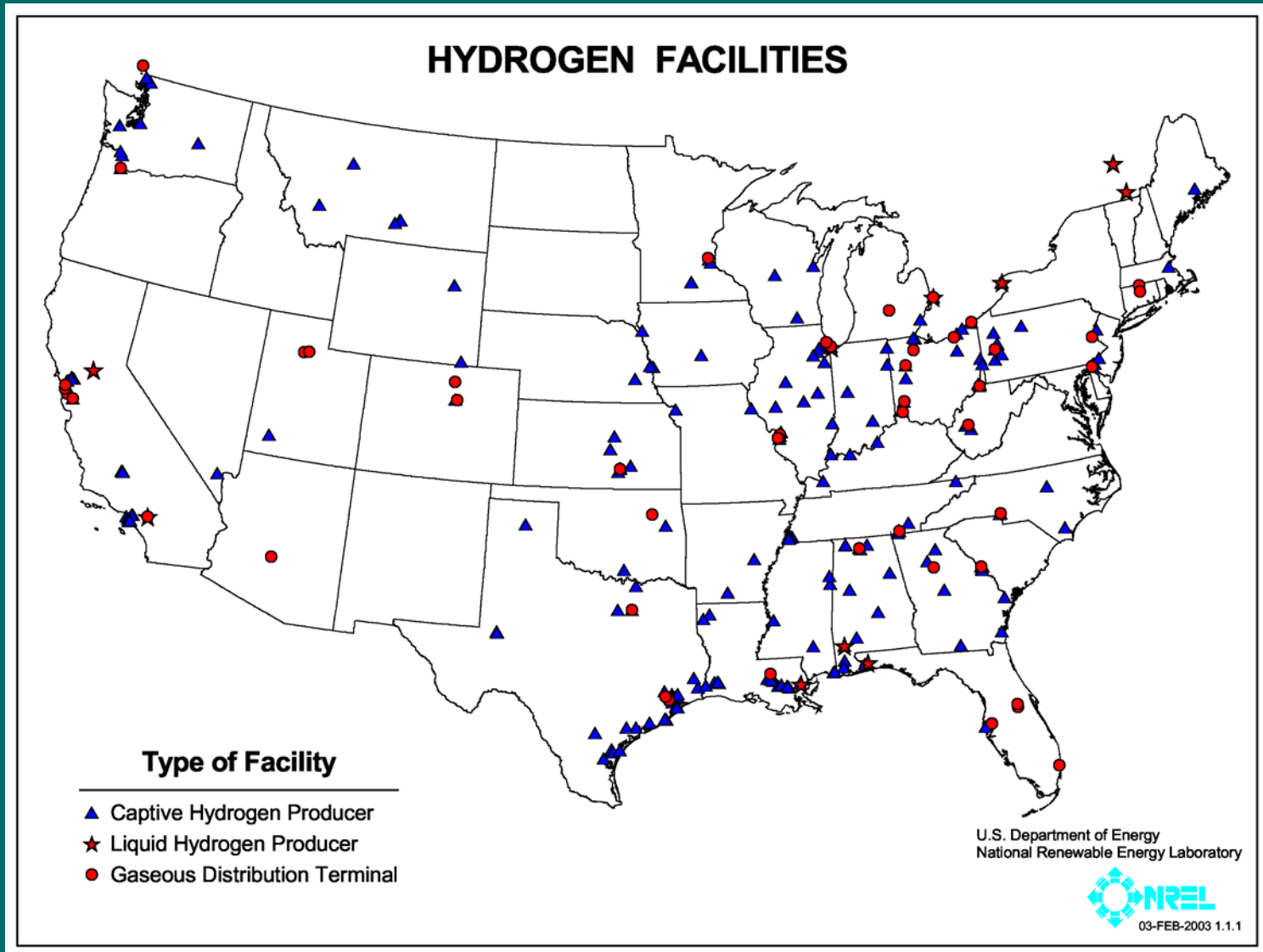
# Hydrogen Infrastructure Development: The Early Years

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# The Early Years

- **Demonstration and Pre-production Vehicles**
- **Primarily fleet users, particularly government**
- **Don't expect parity in cost or convenience for vehicles or fueling**
- **Many on-board vehicle fuel requirements**
- **Vehicles will not be restricted to a single geography**

# The Existing Infrastructure



# Early Adopter Needs

- Acceptance of the early adopters required
- Fleet operations require
  - Low operating and capital cost
  - High reliability
- Vehicle and fueling limitations will provide challenges
- Public fueling would provide reliability, extend vehicle flexibility, add public visibility
- On-site fueling will be desired by many fleets
- Most fleets have small numbers of alternative fueled vehicles <10

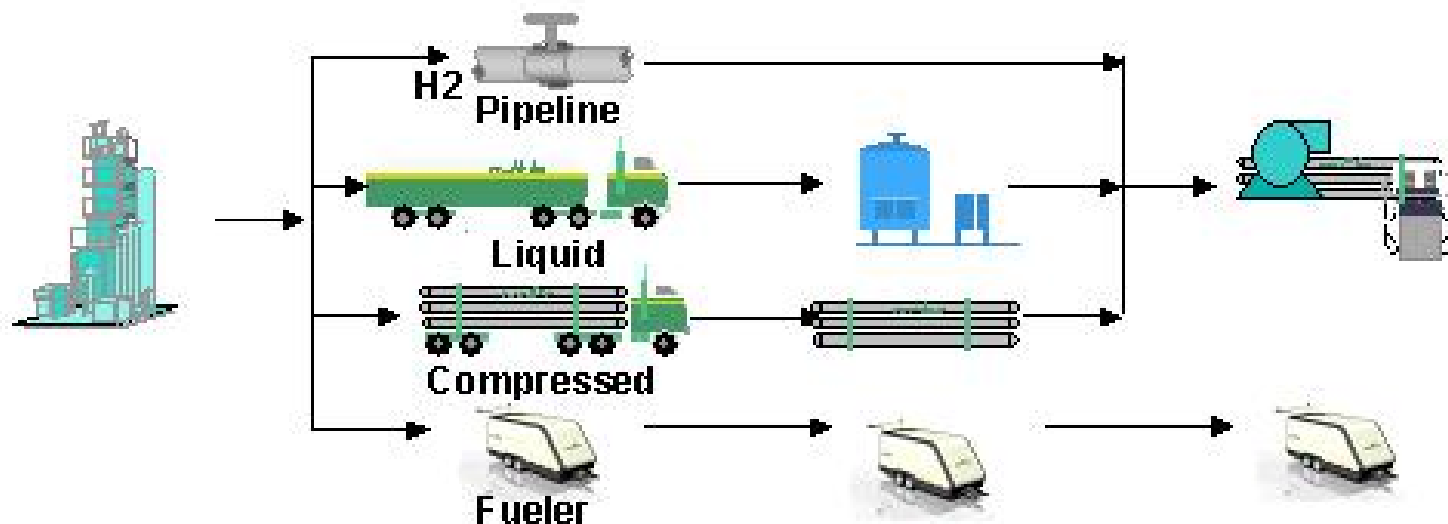
# Central Production Pathways

**Production**

**Distribution**

**Storage**

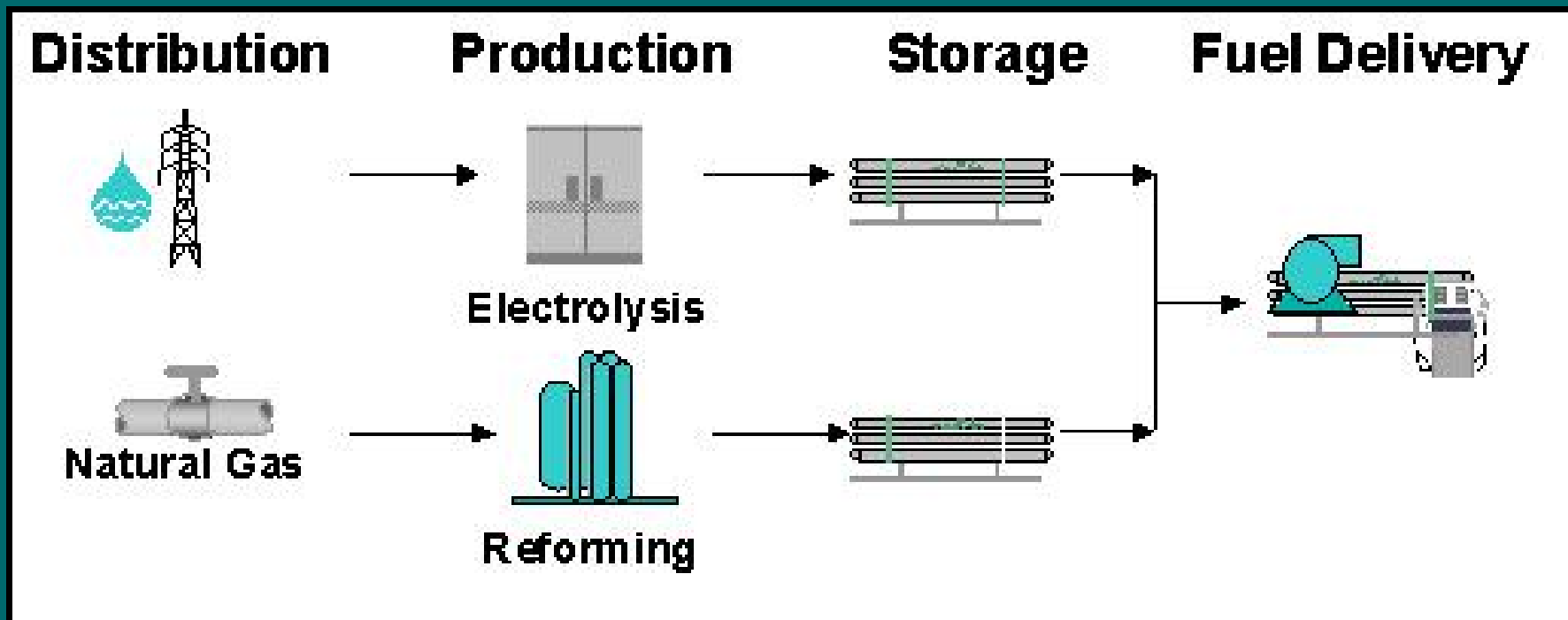
**Fuel Delivery**



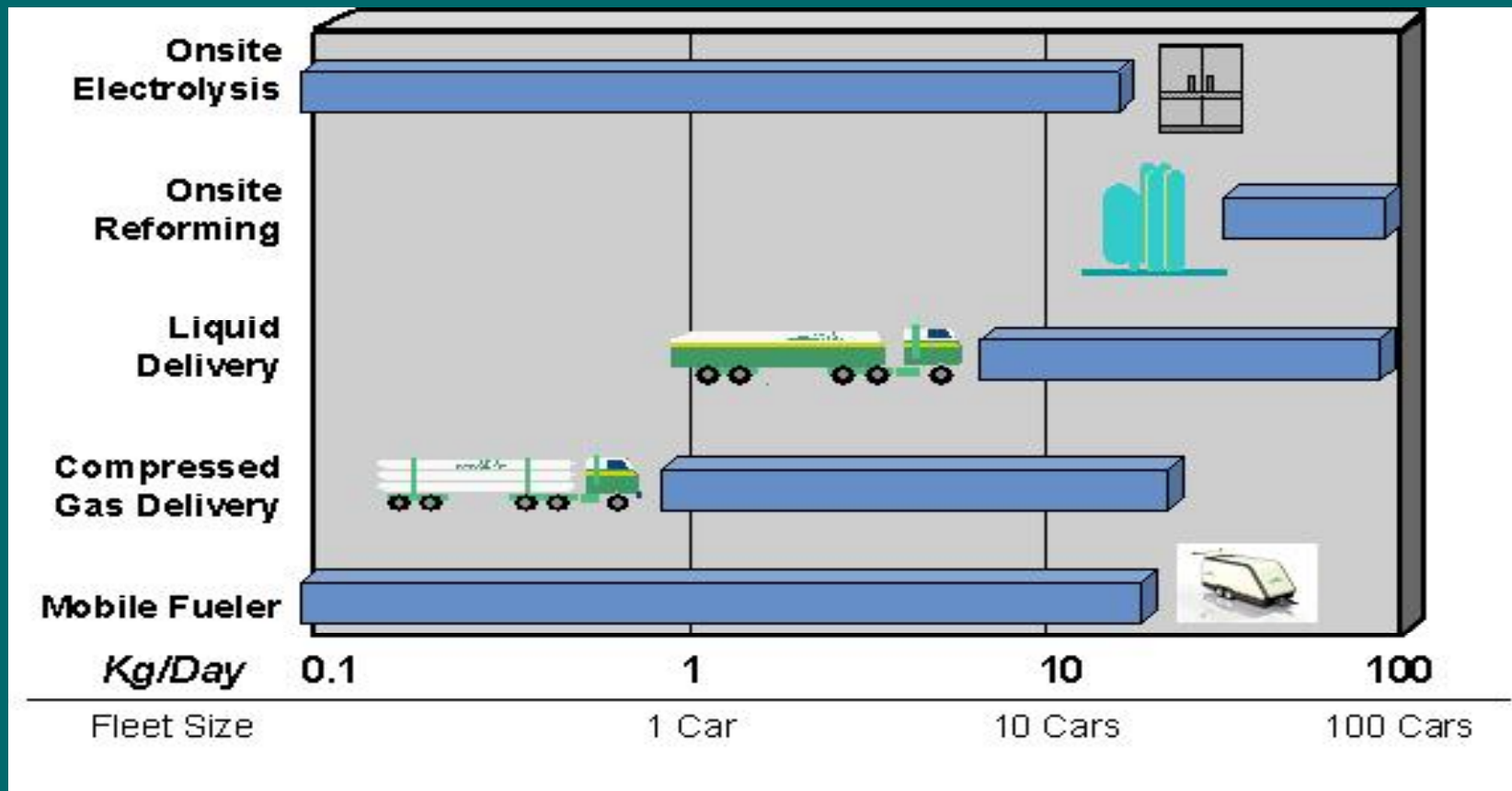
# Hydrogen Fueler



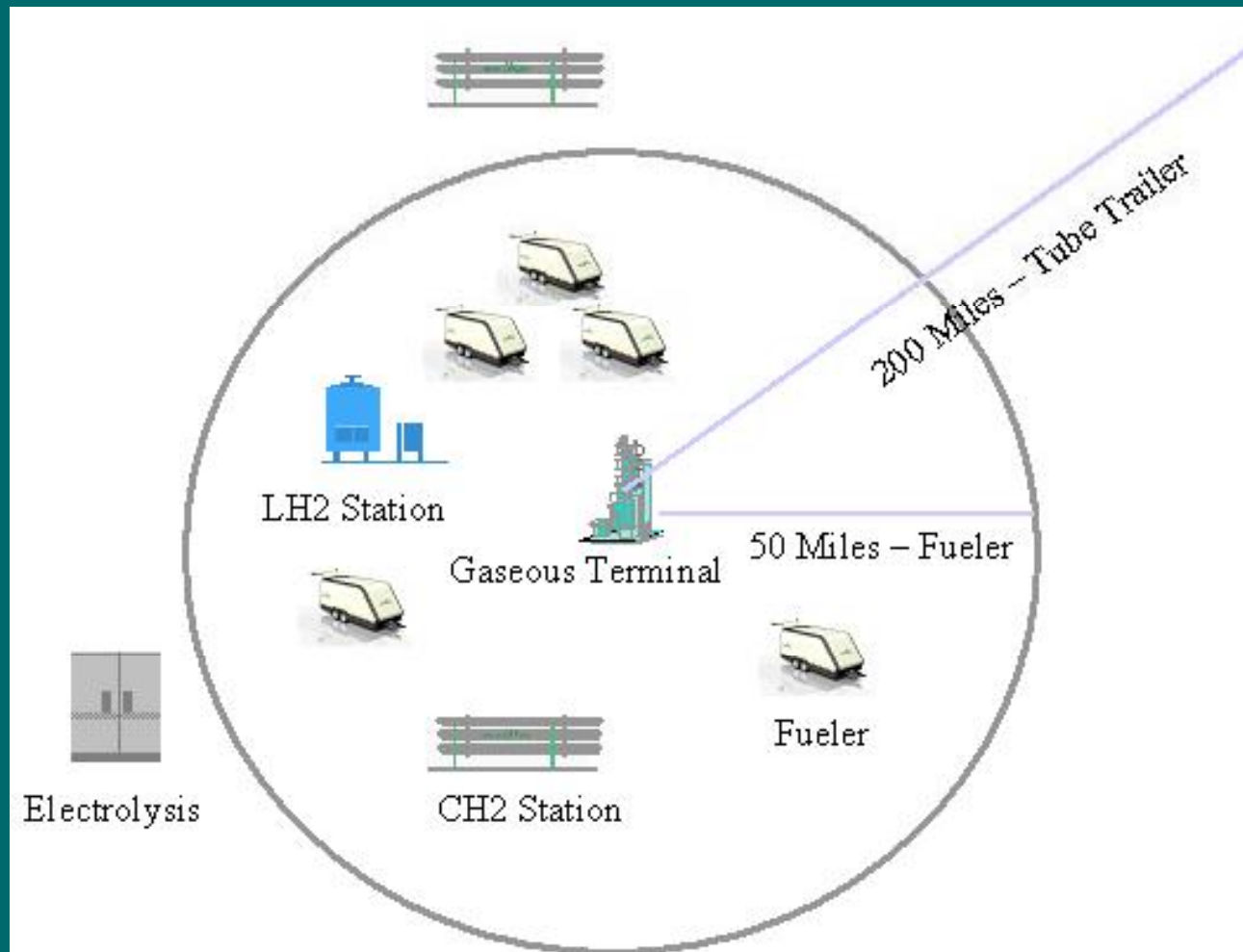
# Onsite Production Pathways



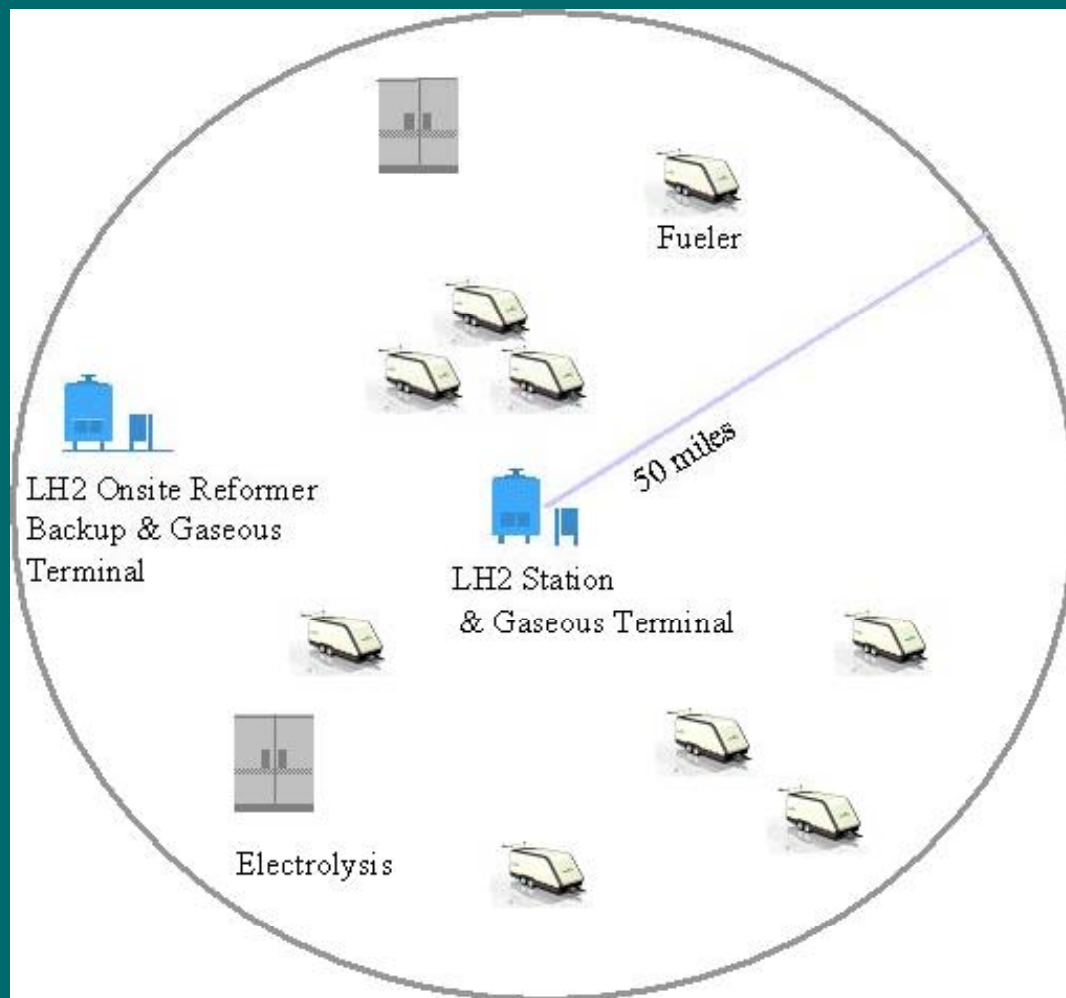
# Guidelines for Pathways Based on Usage



# Deployment Near Local Infrastructure Scenario



# Deployment Outside of Infrastructure Scenario



# Conclusions

- The existing hydrogen infrastructure should be utilized for lowest cost where available.
- Reliability and operational needs of the early adopters must be met and should include on-site and retail fueling.
- We must continue to advance technology by testing and development of long-term fueling infrastructure concepts.